Spot Safety Project Evaluation

Project Log # 200505106

Spot Safety Project # 13-98-017

Spot Safety Project Evaluation of the Actuated Flashing Traffic Signal Installation at the Intersection of SR 3495 – Glen Bridge Rd and SR 3522 – Old Shoals Rd in Buncombe County.

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

_____ 09/16/2005
Majed Bazzari Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 13-98-017 – The Intersection of SR 3495-Glen Bridge Rd and SR 3522-Old Shoals Rd in Buncombe County.

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis of the treatment versus comparison data has been completed to measure the effectiveness of the spot safety improvement. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of an actuated flashing traffic signal. SR 3495-Glen Bridge Rd is a two-lane facility with no left turn lanes at the intersection with SR 3522-Old Shoals Rd. SR 3522-Old Shoals Rd is also a two-lane facility with no left turn lanes. Both SR 3495 and SR 3522 have a speed limit of 35 mph. The intersection is controlled by stop signs on SR 3522. The original problem statement was angle crashes occurring at the intersection due to restricted sight distance by the vehicles entering SR 3495.

The initial crash analysis for SR 3495 at SR 3522 was completed from May 2, 1995 through May 1, 1998 with a total of 9 reported crashes. Eight of the nine crashes were Angle type crashes, which were deemed correctable by the flasher installation. There were One Fatality (Date: 5/1/1998), Three class B injuries and Five class C injuries resulting from these crashes. The final completion date for the flashing traffic signal installation at the subject intersection was on December 1, 1998.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from November 1, 1998 through January 31, 1999. The before period consisted of reported crashes from September 1, 1992 through October 31, 1998 (6 years and 2 months) and the after period consisted of reported crashes from February 1, 1999 through March 31, 2005 (6 years and 2 months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The analysis also consisted of two different sets of data, the treatment and the comparison data. The treatment data consisted of all crashes within 150 feet of the subject intersection. The comparison data consisted of all crashes within 150 feet of the intersection of SR 3495 - Glen Bridge Rd and SR 3553-New Rockwood Rd–SR 3527–Bradley Branch Rd. *(Please see attached location map for further details).*

The following data table depicts the Naive Before and After Analysis for the above information. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. These crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

Treatment Information			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Total crashes	22	21	-4.5
Total Severity Index	11.9	7.4	-37.7
Frontal Impact Crashes	20	21	5.0
Frontal Severity Index	12.3	7.4	-39.5
Volume	4900	5900	20.4
Comparison Information			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Total crashes	32	31	-3.1
Total Severity Index	13.9	6.8	-51.3
Frontal Impact Crashes	20	26	30.0
Frontal Severity Index	16.1	7.1	-56.1
Volume	3900	4700	20.5
Odds Ratio: Treatment versus Comparison			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Treatment Total Crashes	22	21	**-1.5**
Comparison Total Crashes	32	31	
Treatment F.I. Crashes	20	21	**-19.2**
Comparison F.I. Crashes	20	26	

The naive before and after analysis at the treatment location resulted in a 4.5 percent decrease in Total Crashes, a 5.0 percent increase in Frontal Impact Crashes, a 37.7 percent decrease in the Total Severity Index, a 39.5 percent decrease in the Frontal Severity Index, and a 20.4 percent increase in Average Daily Traffic (ADT). The comparison locations resulted in a 3.1 percent decrease in Total Crashes, a 30.0 percent increase in Frontal Impact Crashes, a 51.3 percent decrease in the Total Severity Index, a 56.1 percent decrease in the Frontal Severity Index, and an 20.5 percent increase in ADT. The before period ADT year was 1995 and the after period ADT year was 2002.

The Odds Ratio is used as another means of calculating the treatment effect. The total crashes in the before and after period from the Comparison intersections are used to calculate the percent reduction in total crashes for the Treatment Intersection. As shown in the table above, using the

Odds Ratio calculation, there is a 1.5 percent decrease in Total Crashes and a 19.2 percent decrease in Frontal Impact Crashes at the treatment intersection.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 4.5 percent decrease in Total Crashes and a 5.0 percent increase in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 1.5 percent decrease in Total Crashes and a 19.2 percent decrease in Frontal Impact Crashes. The summary results above demonstrate that the treatment location appears to have had a slight decrease in the number of Total Crashes while the change in the number of Frontal Impact Crashes ranges between an increase to a decrease from the before to the after period.

According to the crash reports and the field investigation for the treatment site there is still an existing sight distance problem. A further investigation into the sight distance issue may be needed. There are tree branches on SR 3522 that limit the visibility of the stop sign when approaching the treatment intersection. Improving the visibility by trimming the tree branches is recommended. (*Please see attached photos*).

From the above crash statistics it can be seen that the main effect of the flasher was reducing the severity of the crashes from the before to the after period while the reduction in the number of both Total and Frontal Impact Crashes from the before to the after period was minimal.

Looking at the collision diagram in the before period the crashes were distributed on the four quadrants of the intersection while in the after period a large portion of the crashes (76 %) occurred in the south east quadrant of the intersection. It can be concluded that the flasher had a positive impact for vehicles traveling south on SR 3522 (58.3 percent reduction in crashes) while the impact was negative for vehicles traveling north on SR 3522 (77.8 percent increase in crashes) from the before to the after period.

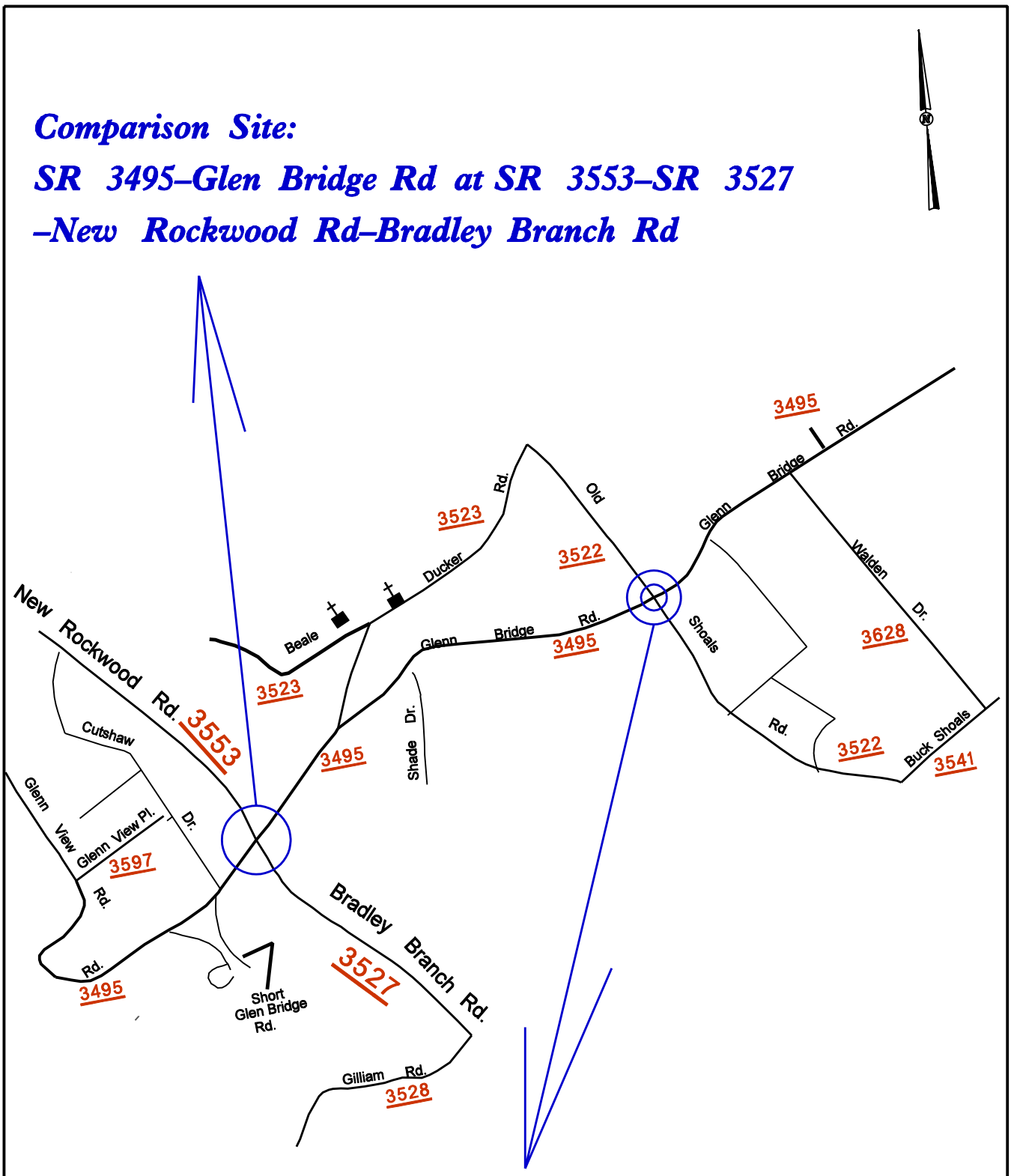
The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of 1.5 percent decrease to 4.5 percent decrease in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection can be in the range of 5.0 percent increase to 19.2 percent decrease in crashes. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.

Evaluation of Spot Safety Project Number 13–98–017

Location Map, Buncombe County

Comparison Site:

SR 3495–Glen Bridge Rd at SR 3553–SR 3527 –New Rockwood Rd–Bradley Branch Rd



Treatment Site:

SR 3495–Glen Bridge Rd at SR 3522–Old Shoals Rd

location map.dgn 11/10/2005 02:16:52 PM

Treatment Sight Photos (Taken on July 28, 2005)

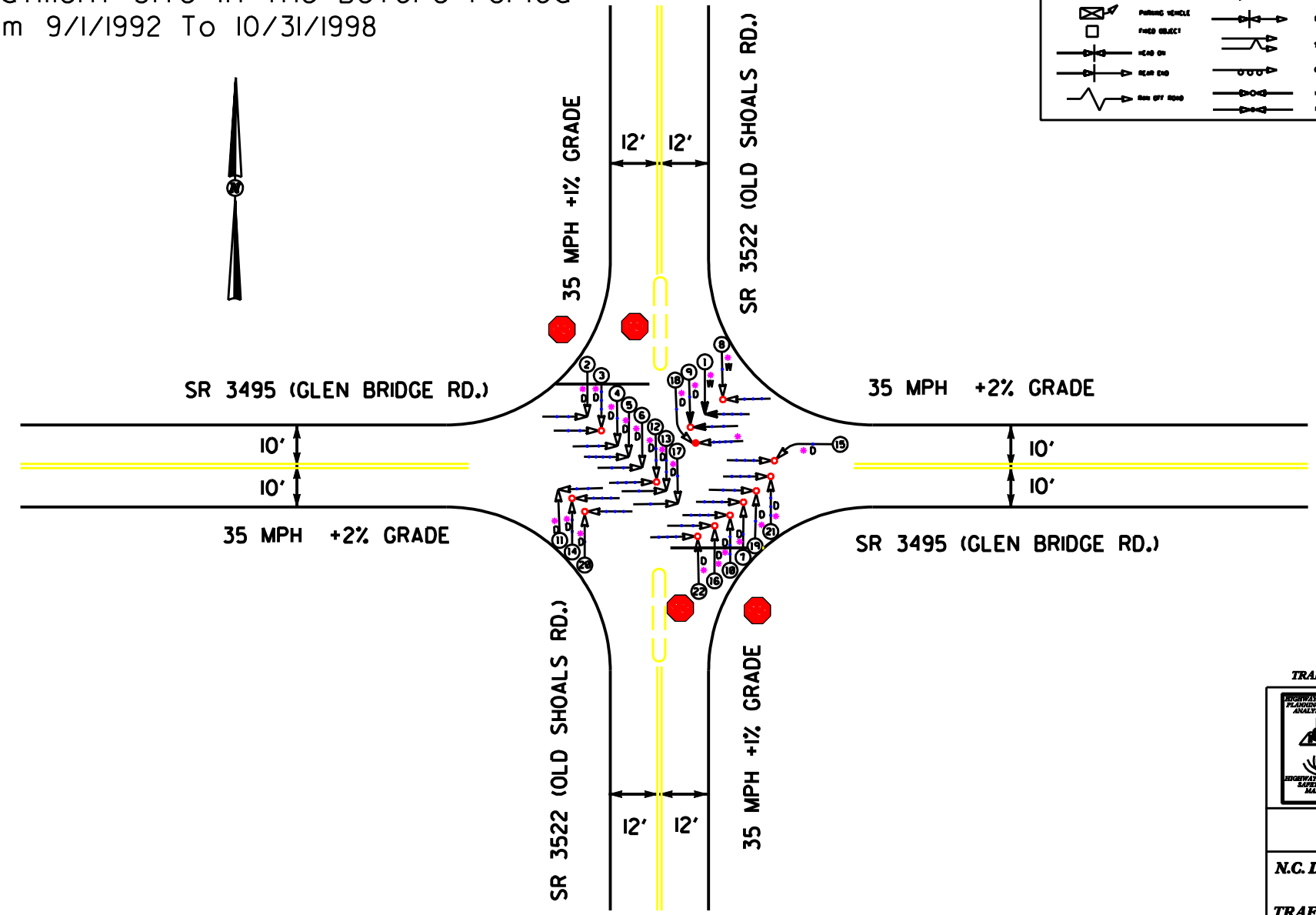
Looking South on SR 3522 – Old Shoals Rd.

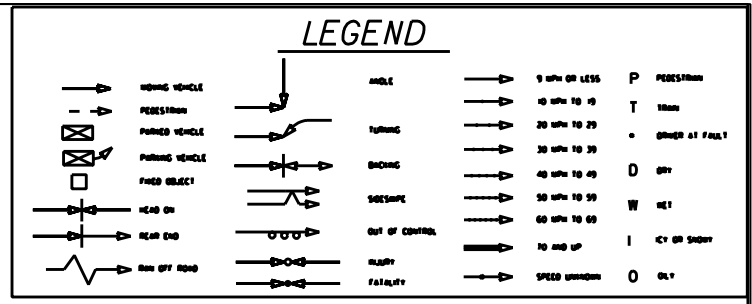
Looking North on SR 3522 – Old Shoals Rd.

Looking West on SR 3495 – Glen Bridge Rd.

Looking East on SR 3495 – Glen Bridge Rd.

BUNCOMBE COUNTY
SR 3495-Glen Bridge Rd at SR 3522-Old Shoals Rd
Treatment Site in The Before Period
From 9/1/1992 To 10/31/1998





TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM

SCALE: NOT TO SCALE

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH

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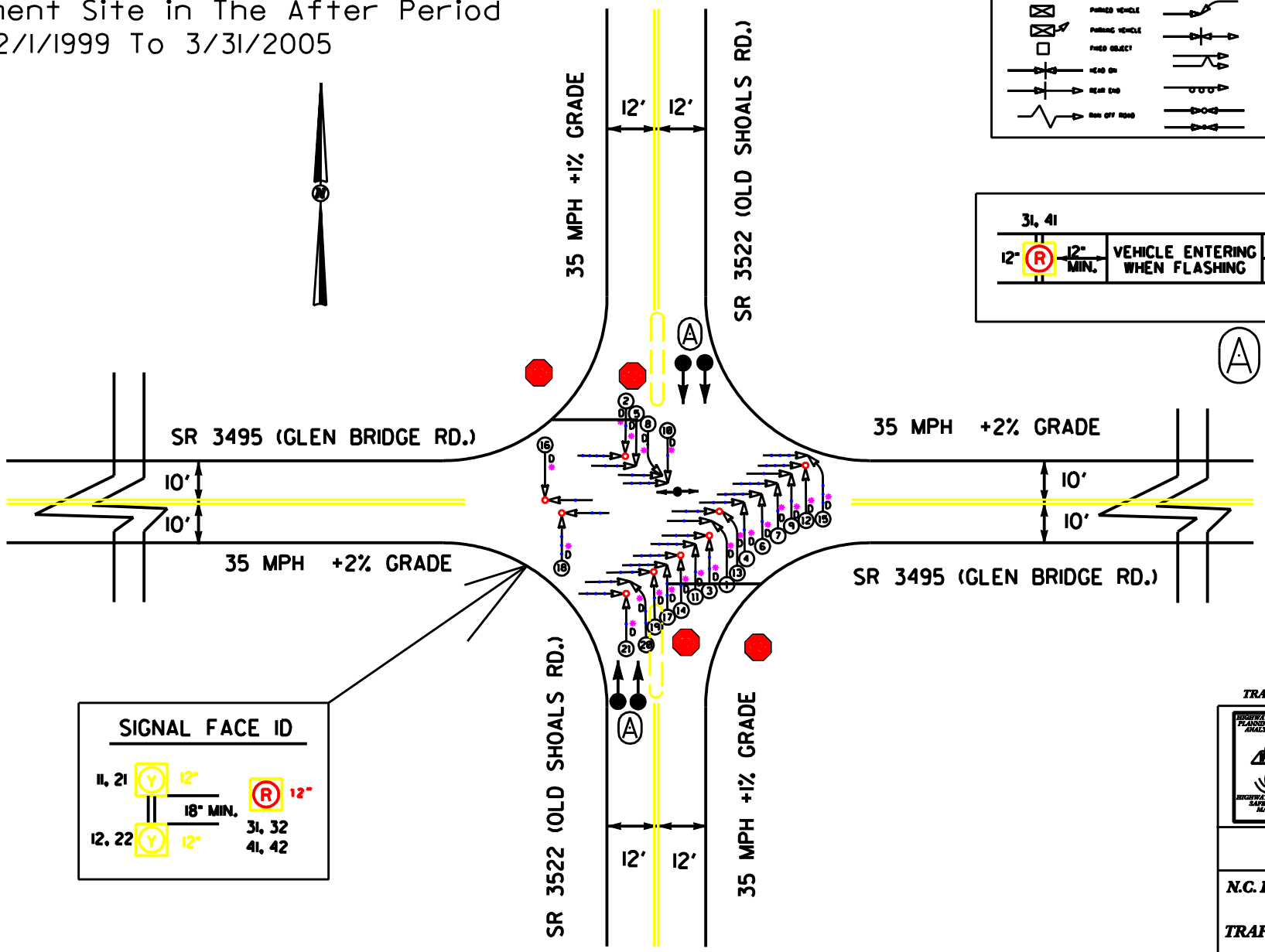
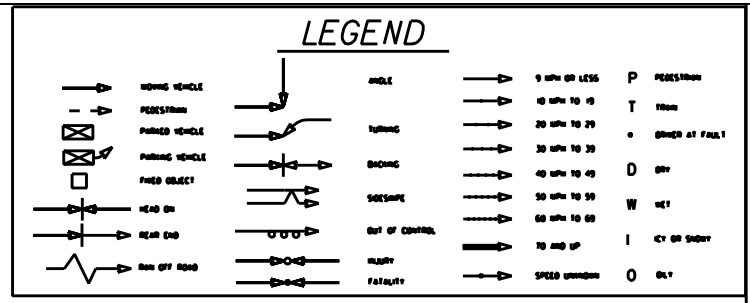
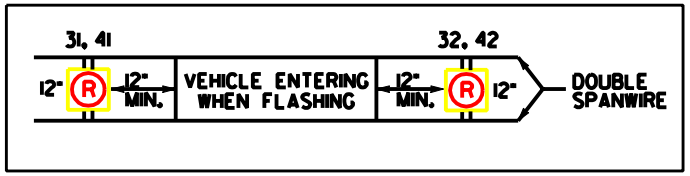
BUNCOMBE COUNTY
SR 3495-Glen Bridge Rd at SR 3522-Old Shoals Rd
Treatment Site in The After Period
From 2/1/1999 To 3/31/2005







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